

**UNITED STATES DEPARTMENT OF COMMERCE****Patent and Trademark Office**Address: COMMISSIONER OF PATENTS AND TRADEMARKS
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/639,486 08/14/00 COBBLEY C 3636.1US (97-

IM22/1031

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EXAMINER

PITTMAN, Z

ART UNIT

PAPER NUMBER

1725

DATE MAILED:

10/31/01

3**Please find below and/or attached an Office communication concerning this application or proceeding.****Commissioner of Patents and Trademarks**

Office Action Summary	Application No.	Applicant(s)
	09/639,486	COBBLEY ET AL.
	Examiner	Art Unit
	Zidia Pittman	1725

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 14 August 2000.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-11, 15 and 16 is/are rejected.
- 7) Claim(s) 12-14 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 . | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2-7 recite the limitation "the pickup tool" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 8 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Boyd et al (USPN 5,788,143).

Boyd et al teaches an indexing turret head containing various heads including a vacuum pickup head, a component bank containing DCA chips, a programmable Cartesian coordinate gantry for positioning the heads contained within the indexing turret head in position over a substrate. It also comprises two vision systems, the first being used for alignment of the DCA site on the substrate, the second being used for

positioning and alignment of the pickup head and the DCA chip site. The substrate is positioned under the vision system using a programmable "XY" table. A vacuum pick-up head having at a first end a template having apertures. These apertures have a footprint corresponding to the footprint of a DCA chip site on a substrate. A second end of the head has a tube which connects via a control means to a vacuum pump. There is also a reservoir of solder particles in the form of a fluidized bed. The means for achieving a fluidized bed of solder particles are similar to that used for many other types of small particles. The pick-up head initially has no suction applied via control means and tube from the vacuum pump. The pick-up head is lowered into the reservoir and the suction from the vacuum pump applied via the control means and tube. Air flows into the pick-up head through the apertures in the first end and solder particles are attracted from the reservoir to engage with holes in the template at the first end of the head. The pick-up head is now removed from its position near to the DCA site and a reflow head containing a heat source is positioned over the site. Heat is applied from the reflow head to the solder particles. An enhancement to the embodiments described includes the use of positive pressure applied to the pick-up head to assist ejection of the solder particles onto the DCA chip site contacts. Solder particles of approximately 0.125 mm that are used is well known. (abstract; Figures 2 and 3; column 3 line 61 – column 5 line 16)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3, 9-11, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boyd et al (USPN 5,788,143) in view of Mays et al (USPN 6,196,439).

Boyd et al teaches an indexing turret head containing various heads including a vacuum pickup head, a component bank containing DCA chips, a programmable Cartesian coordinate gantry for positioning the heads contained within the indexing

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turret head in position over a substrate. It also comprises two vision systems, the first being used for alignment of the DCA site on the substrate, the second being used for positioning and alignment of the pickup head and the DCA chip site. The substrate is positioned under the vision system using a programmable "XY" table. A vacuum pick-up head having at a first end a template having apertures. These apertures have a footprint corresponding to the footprint of a DCA chip site on a substrate. A second end of the head has a tube which connects via a control means to a vacuum pump. There is also a reservoir of solder particles in the form of a fluidized bed. The means for achieving a fluidized bed of solder particles are similar to that used for many other types of small particles. The pick-up head initially has no suction applied via control means and tube from the vacuum pump. The pick-up head is lowered into the reservoir and the suction from the vacuum pump applied via the control means and tube. Air flows into the pick-up head through the apertures in the first end and solder particles are attracted from the reservoir to engage with holes in the template at the first end of the head. The pick-up head is now removed from its position near to the DCA site and a reflow head containing a heat source is positioned over the site. Heat is applied from the reflow head to the solder particles. An enhancement to the embodiments described includes the use of positive pressure applied to the pick-up head to assist ejection of the solder particles onto the DCA chip site contacts. Solder particles of approximately 0.125 mm that are used is well known. (abstract; Figures 2 and 3; column 3 line 61 – column 5 line 16)

Boyd et al does not teach a tool body controllably movable in multiple axes and rotatable about an axis or a heater on the pick-up tool.

Mays et al teaches an apparatus typically including a pick-up and vacuum head for applying a vacuum source to the electronic device so as to engage the electronic device. Heat is transmitted by conduction through the structure of the pick-up and vacuum head to the electronic device. The heat is then conducted through the electronic device to solder balls to heat the solder balls for securing the electronic device to the substrate. The pick-up and vacuum head includes an electronic device engaging portion, a portion for applying a vacuum to the pick-up and vacuum head and a heat source or heat source engaging portion for introducing heat to the pick-up and vacuum head. The embodiment includes a threaded connection for attaching a heat source and/or a vacuum source. The heat and/or vacuum source may be threadably attached to the device pick-up and vacuum head. The heat and vacuum may be introduced into the device pick-up and move the electronic component being attached to the substrate. The vacuum port connected to an internal passage could have interior threads. The vacuum source could have exterior threads complementary to interior threads in the vacuum port. The heat source may be integral with the pick-up and vacuum head. Movement of the device pick-up and vacuum head may be controlled through computerized controls. The device pick-up and vacuum head may be attached to a robot control arm or other device for automatically moving and positioning it. Of course, the system also includes a vacuum source and a heat source. To control movement of the apparatus and attached device, the system may include an x-y

compliant gimbal and a z-compliant spring. The apparatus may be attached to a robot manipulator for altering the position of the apparatus in the x, y, and z directions. (abstract; Figure 8; column 5 line 51 – column 6 line 4; column 6 lines 22-44; column 8 lines 23-29, 49-51); column 9 lines 20-25)

The intended use of the instantly claimed apparatus is noted, however, the intended use does not patentably distinguish said claimed apparatus over the prior art.

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the apparatus of Boyd et al by including the heating means and the axial mobile tool body as disclosed by Mays et al in order to improve temperature control and ensure adequate and uniform heating and to provide pivotal movement of the tool body to facilitate positioning the solder balls.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boyd et al and Mays et al as applied to claim 1 above, and further in view of Ledermann et al (USPN 4,934,309).

Boyd et al in view of Mays et al teaches all the limitations for claim 7 as stated above for claim 1, except for teaching a screen having a plurality of apertures therein, an aperture of the plurality of apertures located adjacent an aperture of the ball seats formed in the body for the solder balls.

Ledermann et al teaches a solder deposition system including a solder mask used to align the solder balls with the solder deposition tool in order to permit a one pass technique for the deposition of the solder balls. (column 5 lines 22-32)

It is the examiner's position that the functionality of the solder mask of the disclosure of Ledermann et al is equivalent to the functionality of the screen of the claimed invention.

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the apparatus of Boyd et al in view of Mays et al by including the a solder mask used to align the solder balls with the solder deposition tool as taught by Ledermann et al in order to permit a one pass technique for the deposition of the solder balls.

Allowable Subject Matter

Claims 4-6, 12, and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 4-6 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not teach or suggest a pickup tool as recited by claim 4, particularly a controllable ball dispenser supplying solder balls to the pickup tool including a ramp for feeding solder balls to the ball seats, the ramp having an upper end and a lower end, and a controllable valve at the lower end of the ramp for releasing a

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single solder ball of the solder balls on demand to the ball seats using a vacuum applied to the ball seats.

The prior art of record does not teach or suggest a pickup tool as recited by claim 12, particularly a solder ball dispenser supplying solder balls to the pickup tool including a tubular ramp for feeding solder balls to the ball seat, the ramp having an upper end and a lower end, and a controllable valve at the lower end of the ramp for releasing a single solder ball of the solder balls on demand to the ball seats using a vacuum applied to the ball seats.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Fukutomi et al (USPN 6,268,648), Sakai et al (USPN 6,109,509), Maxwell et al (USPN 6,069,483), Sakai (USPN 6,065,201), Sakai (USPN 5,867,260), Nakazato (USPN 5,758,409), Sakemi (USPN 5,750,199), Chen et al (USPN 5,704,536), Kawada (USPN 5,626,277), Mullins (USPN 5,540,250), Boyd et al (USPN 5,445,313), and Lastro et al (USPN 5,419,481) are cited as of interest.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zidia Pittman whose telephone number is (703) 305-1248. The examiner can normally be reached on Monday – Thursday and alternate Fridays from 7:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn, can be reached at (703) 308-3318. The official fax phone

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number for the organization where this application or proceeding is assigned is (703) 305-7718. The unofficial fax number for art unit 1725 is (703) 305-6078.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

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10/25/01

Tom Dunn
TOM DUNN
SUPERVISORY PATENT EXAMINER
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